THE GENUS ACOMATACARUS (ACARINA : TROMBICULIDAE)

I. DESCRIPTION OF THREE NEW SPECIES FROM TRINITY BAY, NORTH QUEENSLAND

by R. V. Southcott

[Read 13 September 1956]

SUMMARY

Three new species of the genus *Acomatacarus* Ewing 1942 are described from the Trinity Bay area of north Queensland — *A. cooki* n. sp., *A. mathewi* n. sp., and *A. langani* n. sp. These are compared with the previously known Australian species.

Some comment is made on tracheation within the genus. In *A. cooki* n. sp. and *A. langani* n. sp. the tracheal system does not differ from certain previously described species. In *A. mathewi* n. sp. there is a more defined supracoxal loop above coxa I, and also there appears to be a collection of tracheae in the posterior gnathosomal region, in the midline.

INTRODUCTION

In a study of the Trombiculid and other mite fauna collected by the writer in the vicinity of a scrub typhus focus at Dead Man's Gully, Trinity Bay, north Queensland, in 1943 and 1944 (see Southcott, 1947), a small number of mites of the genus *Acomatacarus* Ewing 1942 (Trombiculidae) was found. These have been found to belong to three species, described as new in the present paper, and named *A. cooki* n. sp., *A. mathewi* n. sp., and *A. langani* n. sp., after three students of the epidemiology of scrub typhus in north Queensland.

At the present time there is no evidence that this genus of Trombiculid mites is of any significance in the epidemiology of the typhus diseases in Australia. The only reference known to the writer suggesting a connexion between *Acomatacarus* and a Rickettsial infection is a report by Chumakov (1955) that *Coxiella* (*Rickettsia*) *burneti* (the causative agent of Q fever) has been isolated in central Asia from "mites of the genera *Leeuwenhoekia* and *Dermanyssus*". That article has been seen by the present writer only in abstract form. Presumably by the term "*Leeuwenhoekia*" the more restricted sense of the genus *Acomatacarus* Ewing 1942 is intended, as at the present time *Leeuwenhoekia* Oudemans 1910 has been restricted by most workers to the genotype, *L. verduni* (Oudemans 1910) from Brazil, and the genus *Acomatacarus* covers species ranging from North America, Europe, Africa, Asia and Australasia (Wharton and Fuller, 1952).

Description of Three New Species

(i) **Acomatacarus cooki** n. sp.

Figs. 1, 2

Description of Larva (from Type specimen ACB 199A): Colour not recorded. Length of idiosoma (moderately engorged specimen) 645μ, width 470μ (animal 730μ long to tip of mouthparts, the chelae). The shape of the moderately engorged Type specimen is typical of the larval Trombiculidae in a moderate state of engorgement, a constricted ovoid.

Dorsal scutum moderately broad. AM setae slightly tapering, 45μ long, with barbed ciliations, and with bases 13μ apart (AMB). AL setae similar to AM, 55μ long; PL setae similar, 72μ long. Sensillae (from ACB 199B, paratype; missing in Type specimen) moderately ciliated, there being 10-12 ciliations, in

the distal half of the seta, seta 53μ long. The standard data for the Type and paratype specimen as follow:

	AW	PW	SB	ASB	PSB	SD	A-P	AM	AL	PL	AMB	Sens.	PW/SD
ACB 199A Type	78	89	27	36	25	61	26	45	55	72	13	—	1·44
ACB 199B Paratype	70	87	29	34	—	—	28	45	55	72	11	53	—

Dorsal abdominal setae similar to the PL scutal setae, 41-49μ long, arranged approximately 2 9 6 7 10 10 8 4 3, total 59.

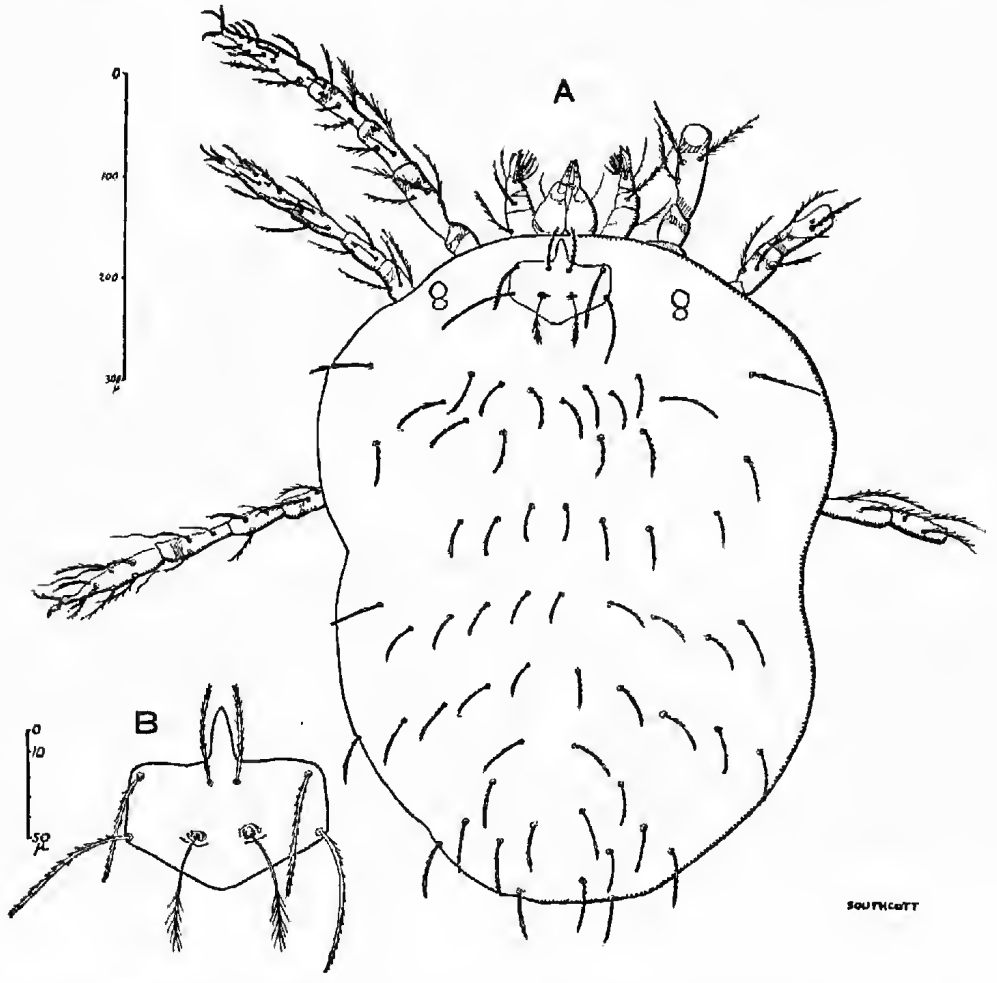

Fig. 1.—*Acomatacarus cooki* n. sp., larva. A, dorsal view, partially engorged; B, dorsal scutum. (From the Type specimen, except the sensillae.)

Eyes 2 + 2, well clear of the dorsal scutum. Anterior eye 20μ across, posterior 14μ across.

Ventral surface: a pair of tapering pointed strongly ciliated setae between coxae III, 36μ long. Behind coxae III are numerous tapering pointed strongly

ciliated setae, arranged as figured; the anterior short, 27-31μ long, the posterior longer, to 46μ long.

Tracheal system as figured.

The legs are all 6-segmented. Leg I 440μ long, II 370μ, III 450μ (all lengths inclusive of coxae and claws). Chactotaxy of legs as figured. Coxa I with 2 setae, tapering, pointed, strongly ciliated, situated as figured, the lateral

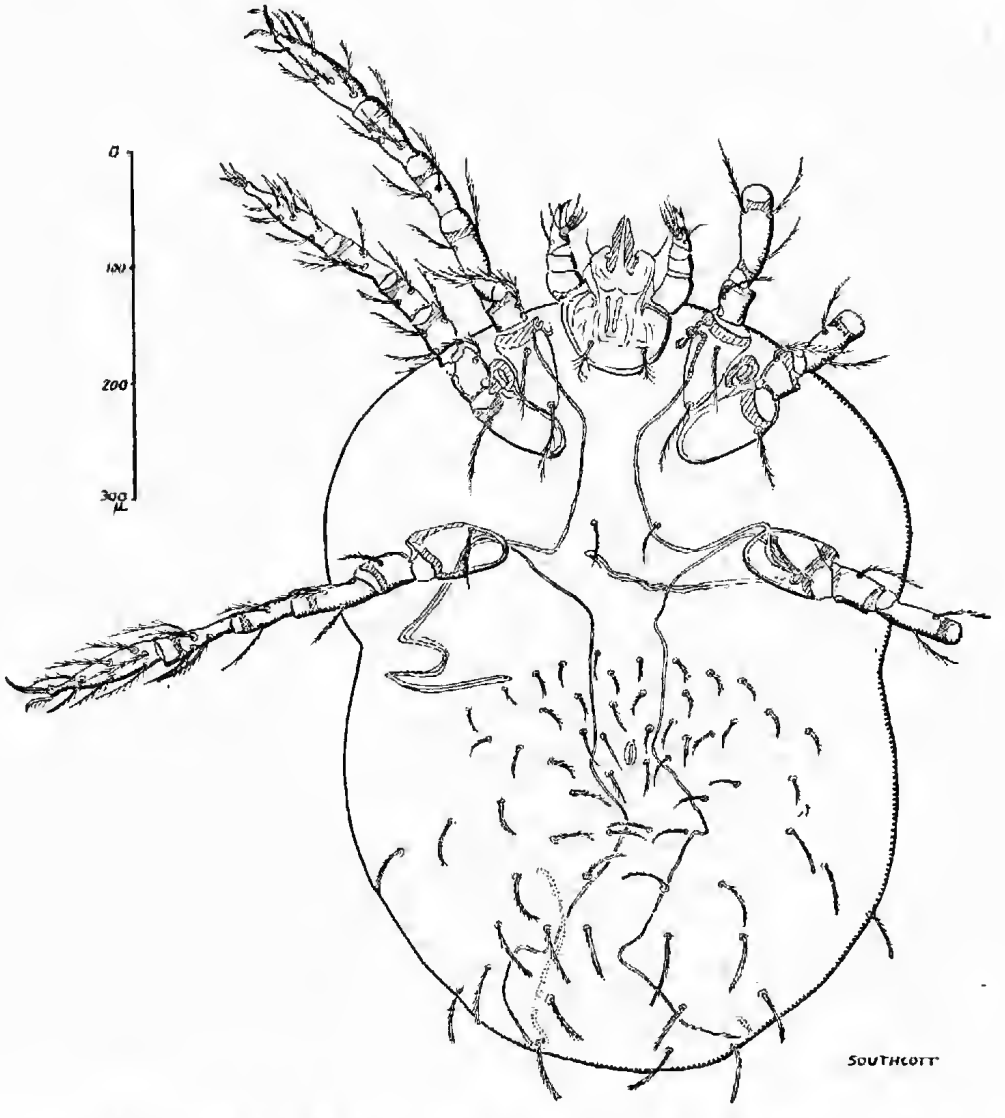

Fig. 2.—*Acomatacarus cooki* n. sp., larva. Ventral view, partially engorged, showing external morphology, and the tracheal system. Posteriorly the part of the trachea nearer the dorsum is shown in stipple. (From the Type specimen.)

seta 55μ long, the medial seta 55μ long. Coxa II with a similar seta 61μ; III seta similar 55μ. Each trochanter with one seta. Tarsus I 110μ long (to origin of claws) by 34μ high; metatarsus I 68μ long. Tarsus III with 1 (?2) whip-like setae; metatarsus III with 2 whip-like setae. Claws and empodium of the tarsi typical, falciform, slender, ciliated.

Capitulum as figured. Chelicerae normal, with 4 ventral bent-over denticles (retention denticles), and dorsally with about 5 saw teeth, the first 3 of these minute, increasing in size posteriorad. Cheliceral fang 42μ long. Galeal seta 34μ long, nearly nude, with only a few small ciliations. Palpal setal formula (Audy's notation) B, B, B N(b) N(b). Dorsal palpal tibial seta strong, curved, strongly ciliated, 28μ long. Palpal tibial claw with two weaker dorsal accessory prongs; main prong 27μ long.

Locality: Two specimens, type specimen ACB 199A and paratype specimen ACB 199B, parasitic in the ear of a domestic cat, in the "posterior pinna pocket" placed at the rear of the edge of the pinna, the animal being a pet in a military camp near Palm Beach, Trinity Bay, north Queensland (map reference 612878 (Cairns 1: 63,360)), 20th December, 1943, along with a small Ixodid tick ACC 159 (unidentified). Specimens collected by the writer; in writer's collection.

The locality concerned was a camp-site about a mile north of the scrub typhus focus at map reference 614863 (Cairns 1: 63,360); that camp-site was, in the writer's experience, free of the disease.

Biology of the Mite: An attempt was made by the writer to rear these two mites to the nymphal stage, using the technique recorded by the writer (1946) for the Erythraeid mites, but with the atmosphere rather damper. The attempt failed, as the technique required had not been mastered. Since then the writer has reared larvae of another species of *Acomatacarus*—*A. adelaideae* (Wom. 1944)—to nymphs, using a customary wet tube and paper rearing technique (these experiments will be described elsewhere). Quite wet conditions are necessary for success.

Comment on Tracheation: The system of tracheation shown for this species is very similar to that recorded by Brennan (1949) for *A. arizonensis* Ewing 1942 from North America; see the comment under the succeeding species.

Systematic Position: This species comes nearest to *A. longipes* Wom. 1945 from New Guinea, but has significantly smaller SD, A-P and AL, by which it may be separated if Womersley's (1945) key is used. Both *A. cooki* n. sp. and *A. longipes* have two whip-like setae on metatarsus III.

Nomenclature: This species is named in honour of Dr. C. E. Cook, whose epidemiological researches were responsible for defining the focus of scrub typhus at Dead Man's Gully, Trinity Bay.

(ii) **Acomatacarus mathewi** n. sp.

Figs. 3, 4.

Description of Larva (from type specimen ACB 607): Colour red. Length of idiosoma (unengorged) 190μ (the animal is 270μ long from tip of chelae to posterior pole of body), width 175μ. Shape roughly globular.

Dorsal scutum of the typical shape for the genus. AM setae tapering, ciliated (barbed), 29μ long, with bases 9μ apart (= AMB); PL setae similar, with adpressed ciliations, 34μ long; AL setae similar but more prominently ciliated, 30μ long. Sensillae delicately ciliated distally, with about 9 ciliations, and about 69μ long. The standard data of the specimens available are:

Number	AW	PW	SB	ASB	PSB	SD	A-P	AM	AL	PL	AMB	Sens.	PW/SD
ACB 607 Type	62	83	26	32	21	53	26	29	30	34	9	69	1·56
ACB 199A Paratype	59	72	23	29	23	52	25	29	26	32	8	62	1·39
ACB 199B Paratype	63	73	24	26	29	55	26	26	26	29	8	—	1·33

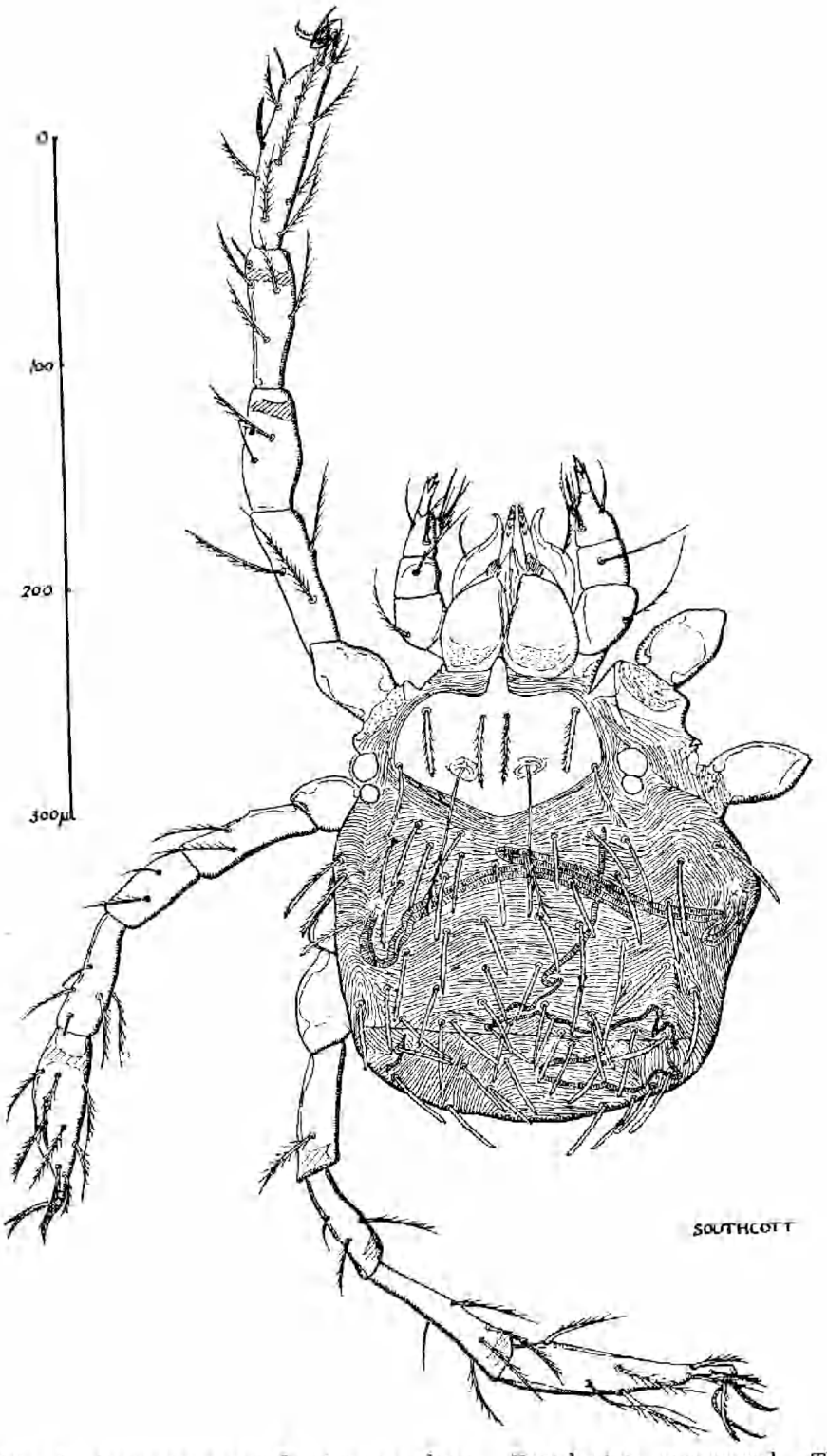

Fig. 3.—*Acomatacarus mathewi* n. sp., larva. Dorsal view, unengorged. The tracheae nearer the dorsum are shown; these connecting at the points marked "X" to those nearer the venter, shown in Fig. 4, q.v. (From the Type specimen.)

Dorsal abdominal setae lanceolate with adpressed ciliations, 29-32μ long, numbering 58 in all, arranged somewhat irregularly in rows of up to 10.

Eyes 2 + 2, as figured; the anterior eye the larger, 19μ across, posterior eye 13μ across.

Ventral Surface: A pair of tapering, pointed, ciliated setae between coxae III, 31μ long; behind coxae III are rows of similar setae, these becoming stronger posteriorad, 24-30μ long, and about 40 in all.

Tracheal system as figured. This will be commented on further below.

The legs are all 6-segmented; I 350μ long, II 340μ, III 385μ (all lengths including coxae and claws). Chaetotaxy of legs as figured. Coxa I with 2 setae, tapering, pointed, strongly ciliated, lateral 42μ long, medial 40μ long. Coxa II with a similar seta, 37μ long, coxa III seta similar, 38μ long. Each trochanter with a single seta, arising anteroventrally. Tarsus I 96μ long (to origin of claws) by 26μ high; metatarsus I 61μ long. On tarsus III is one long whip-like seta, with a single ciliation as figured; no such seta on metatarsus III, only the normal spiniform seta being present. Claws of tarsi falciform, ciliated along their sides, empodium thinner, also lightly ciliated along its sides.

Capitulum as figured. Chelicerae normal, each blade with 5 mamillate recurved retention teeth on the inner (ventral) side, bent over dorsomedially; on the outer (dorsal) side of the blade are 3 hooked saw-teeth, decreasing in size anteriorad. Cheliceral blade about 44μ long. Galeal seta pointed, with adpressed ciliations along the outer side, 26μ long. Palpal setal formula B(b), B(b), B b b(?N). Dorsal palpal tibial seta rather slender, tapering, lightly ciliated, pointed, 22μ long. Palpal tibial claw typical of genus, with two dorsal accessory teeth.

Localities: Type specimen ACB 607 collected free at Dead Man's Gully, Trinity Bay, north Queensland, 2nd January, 1944, at map reference 614863 (Cairns 1: 63,360) (the site of the scrub typhus focus indicted by C. E. Cook). Paratypes ACB 189 A and B, collected at Trinity Bay, map reference (same map) 6483, a military camp-site free of the disease, 29th November, 1943, parasitic in the left external auditory meatus of a small skink, *Lygosoma* (*Sphaenomorphus*) *spaldingi* (Number R58, R.V.S. = South Australian Museum Register Number R2953 (presented) — lizard identified by F. J. Mitchell, South Australian Museum). Specimens collected by writer; in writer's collection.

Comment on Tracheation: As the figures indicate, there appear to be some differences in the tracheal system of this species from e. g. *A. cooki*. In *A. mathewi* there is a loop of trachea overlying coxa I; this appears to be more defined in position than has hitherto been described in all, or nearly all, species of this genus. Thus nothing comparable is described or figured by André (1943 a, b) for *A. paradoxus* (Europe), or by Brennan (1949) for *A. arizonensis* (North America). Hoffmann (1948) figured a highly convoluted trachea for the Mexican *A. chiapanensis*, and also (1951) for another Mexican species, *A. bakeri*. In both of these Mexican species there is some tendency for a loop to form in the trachea above coxa I, but in neither case is it placed as far laterally as in *A. mathewi*.

In *A. mathewi* there also appears a collection of tracheae—a "gnathosomal nexus"—in the region below the AM scutal setae, i.e. above the posterior part of the gnathosoma (see figure), but owing to difficulty in resolution this is hard to define clearly.

Systematic Position: This species, like the preceding, comes nearest to *A. longipes* in Womersley's (1945) key. From the latter, however, *A. mathewi* differs in having a sigoificantly smaller AW, PW, SD, AL and PL. In fact, the PL in *A. mathewi* are only half the length of those in *A. longipes*. Also, in *A. mathewi* the metatarsus (tibia) III lacks whip-like setae; in *A. longipes* there are two such.

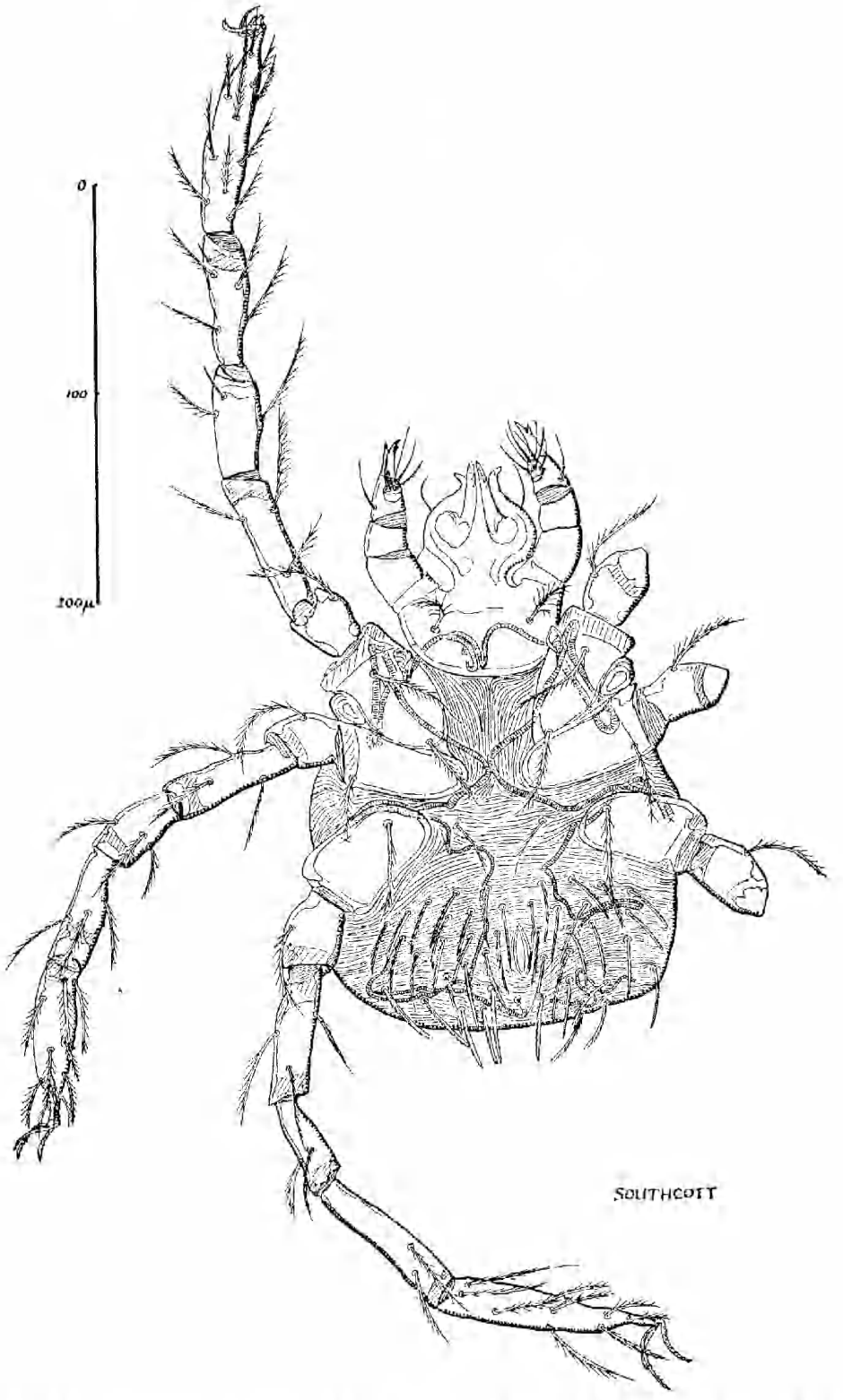

Fig. 4.—*Acomatacarus mathewi* n. sp., larva. Ventral view, unengorged. The tracheae nearer the venter are shown connecting at the points marked "X" to those more dorsal shown in Fig. 3, q.v. (From the Type specimen.)

Nomenclature: This species is named after R. Y. Mathew, a previous student of the epidemiology of scrub typhus in this area.

(iii) Acomatacarus langani n. sp.

Fig. 5

Description of Larva (from type specimen ACB 197 A6, somewhat damaged, but quite a distinct species). Colour not recorded. Length of idiosoma (partially engorged) approximately 400μ, width approximately 300μ.

The dorsal scutum small, with shape and structure as figured. AM scutal setae slightly tapering, blunted at tip, finely ciliated; AL and AM setae similar. Sensilla as figured, typical, with about 10 ciliations. The standard data as follow:

AW	PW	SB	ASB	PSB	SD	A-P	AM	AL	PL	AMB	Sens.	PW/SD
48	65	22	27	18	45	26	17	24	27	7	50	1·44

Dorsal abdominal setae tapering, blunted, ciliated, to 22μ long, the ciliations slight, bractate, pointed, a little outstanding; complete arrangement and total number of setae not available, but the setae are not unduly numerous, and are arranged in rows of mostly about 8-10.

Eyes 2 + 2; anterior 9μ across, posterior 8·5μ across. The eyes in the specimen are well clear of the shield (46μ away, indicative of moderate engorgement).

Ventral surface as figured. Setae between coxae III tapering, pointed, ciliated, 24μ long. Area behind coxae III not available for description.

Tracheal system as figured; this appears comparable to that of e.g. *A. cooki* and *A. arizonensis*.

Legs all 6-segmented. Leg I 250μ long, II 220μ, III 250μ (all lengths including coxae and claws). Chactotaxy of legs as figured. Coxa I with 2 setae, tapering, pointed, ciliated, lateral 30μ long, medial 29μ long. Seta on coxa II similar, 22μ long; on III similar, 25μ long. Each trochanter with one seta. Tarsus I 67μ long (to origin of claws) by 18μ high. Metatarsus I 38μ long. Tarsus III with one whip-like seta; none on metatarsus III. Claws and empodium of tarsi normal.

Capitulum as figured. The cheliceral fang carries only a single ventro-external tooth, a little away from the edge (retention denticle), as figured. Dorsal edge of fang with the usual row of saw-teeth, increasing in size posteriorad, 6 in all. Galeal seta lightly ciliated, 15μ long. Palpal setal formula B, B, B b b. Dorsal palpal tibial seta moderately slender, curved, ciliated, 13μ long. Palpal tibial claw typical, with two dorsal accessory teeth.

Locality: Palm Beach, Trinity Bay, north Queensland, 18th December, 1943, parasitic in the external auditory meatus of a small skink, *Lygosoma* (*Leiolopisma*) *bicarinata* Macl. (No. R 67, R.V.S.= South Australian Museum Number R 2980 (donated) (identified by F. J. Mitchell, South Australian Museum)), along with several specimens of *Trombicula* (*Eutrombicula*) *tovelli* Wom. 1952 (ACB 197 A 1-5, B 1, 2) and a single female Mesostigmatid mite, *Haemolaelaps megaventralis* (Strandtmann 1947) (number ACC 160); the lizard also parasitized by 2 axillary *T.* (*E.*) *tovelli* (ACB 197 C, D). Specimens collected by the writer, in writer's collection.

Systematic Position: This species fits into caption (3) of Womersley's (1945) key, which includes *A. adelaideae* (Wom. 1944), *A. longipes* Wom. 1945, *A.*

australiensis (Hirst 1925), *A. nova-guinea* (Wom. 1944), and *A. barrinensis* Wom. 1945, but differs from these species, as well as from *A. cooki* n. sp. and *A. mathewi* n. sp. in the much smaller scutal dimensions. The presence of a single ventral denticle on the cheliceral fang of *A. langani* n. sp. is also possibly significant, and this character might repay further study from a systematic viewpoint; usually there appear to be about 5 denticles in this situation, where this has been studied.

Nomenclature: This species is named after A. M. Langan, who studied the epidemiology of scrub typhus in this area, in company with R. Y. Mathew.

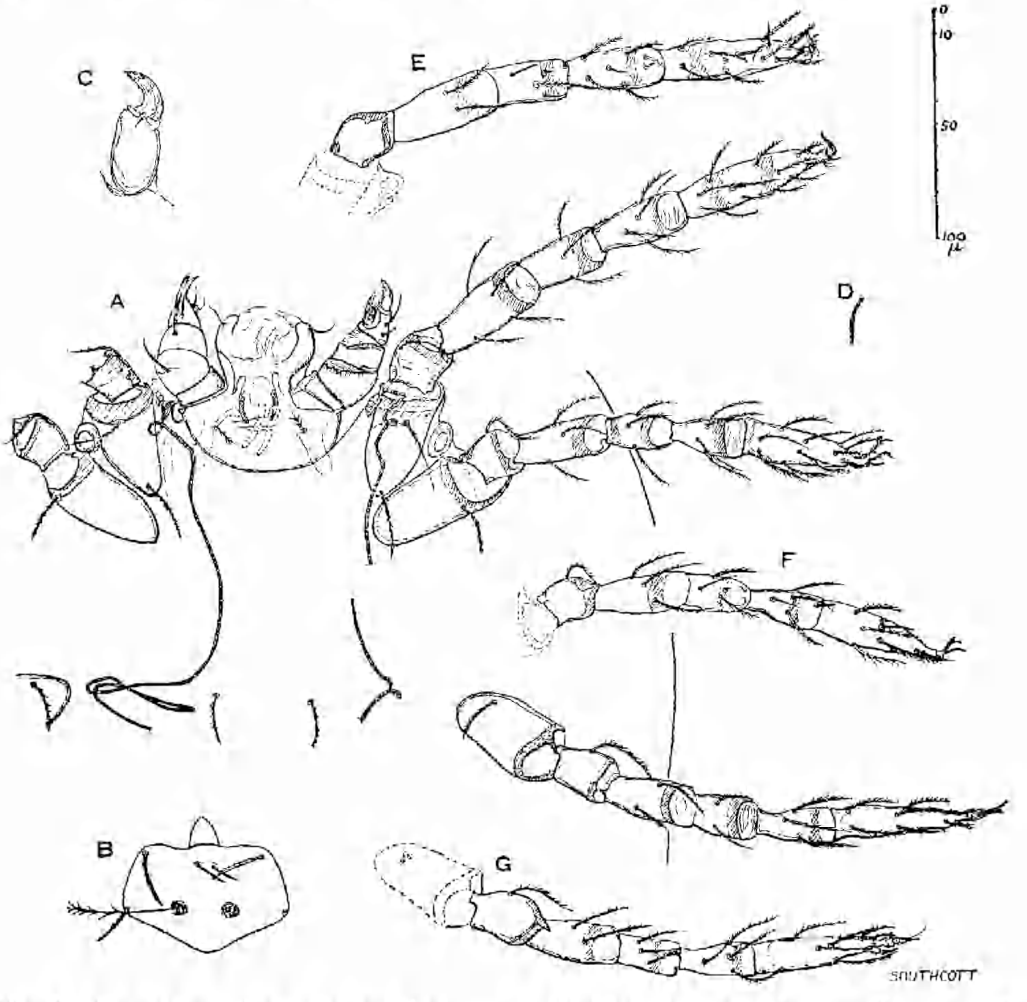

Fig. 5.—*Acomatacarus langani* n. sp., larva. A, ventral aspect, anteriorly, partially engorged, without chelicerae, and showing dorsal aspect of palp on left; B, dorsal scutum; C, right chelicera, detached, lateral aspect; D, dorsal abdominal seta; E, F, G, dorsal aspects of right legs I, II and III respectively. (All figures to scale shown; from the Type specimen.)

REFERENCES

ANDRÉ, M., 1943a. Une espèce nouvelle de *Leeuwenhoekia* (Acarien) parasite de scorpions, Bull. Mus. nat. Hist. nat. Paris (2), **15** (5), pp. 294-298.

ANDRÉ, M., 1943b. L'appareil respiratoire du *Leeuwenhoekia paradoxa* M. André [forme larvaire de *Thrombidiidae* (*Acariens*)], Bull. Mus. nat. Hist. nat. Paris (2), **15** (6), pp. 406-409.

BRENNAN, J. M. 1949. Tracheation in Chiggers with Special Reference to *Acomatacarus arizonensis* Ewing (Acarina, Trombiculidae), J. Parasitol., 35 (5), pp. 467-471.

CHUMAKOV, M. P., 1954. [Queensland Fever—A Zoonotic Rickettsiosis of Man and Animals (in Russian)], Veterinariya, Moscow, **31** (9), pp. 26-32. [Summary from Rev. Applied Entomol., Ser. B, 1955, Oct., **43** (10), p. 147, *per* Trop. Dis. Bull. 1956, March, **53** (3), pp. 305-306.]

COOK, C. E., 1944. Observations on the Epidemiology of Scrub Typhus, Med. J. Aust., **2**, pp. 539-543.

HOFFMANN, A., 1948. Dos especies nuevas de Trombiculidos Mexicanos, Rev. Inst. Salubr. Enferm. Trop., Mexico **9** (3), pp. 177-189.

HOFFMANN, A., 1951. Contribuciones al conocimiento de los Trombiculidos Mexicanos, 3a parte, Ciencia **11** (1-2), pp. 29-36.

SOUTHCOTT, R. V., 1946. Studies on Australian Erythraeidae (Acarina), Proc. Linn. Soc. N.S. Wales, **71** (1-2), pp. 6-48.

SOUTHCOTT, R. V., 1947. Observations on the Epidemiology of Tsutsugamushi Disease in North Queensland, Med. J. Aust., **2**, pp. 441-450.

WHARTON, G. W., and FULLER, H. S., 1952. A Manual of the Chiggers. The biology, classification, distribution and importance to man of the larvae of the family Trombiculidae (Acarina), Mem. Ent. Soc. Washington, Number **4**, pp. 1-185.

WOMERSLEY, H., 1945. Acarina of Australia and New Guinea. The Family Leeuwenhoekiidae, Trans. Roy. Soc. S. Aust., **69** (1), pp. 96-113.